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| APPLICATION NO.  | FILING DATE     | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |  |
|--|-----------------|----------------------|---------------------|------------------|--|
| 09/109,261   | 06/30/1998      | GANG BAI             | 042390.P5769        | 3347             |  |
| 7  | 7590 03/13/2002 |                      |                     |                  |  |
| BLAKELY SOKOLOFF TAYLOR & ZAFMAN<br>SEVENTH FLOOR<br>12400 WILSHIRE BOULEVARD<br>LOS ANGELES, CA 90025 |                 |                      | EXAMINER            |                  |  |
|  |                 |                      | WARREN, MATTHEW E   |                  |  |
|  |                 |                      | ART UNIT            | PAPER NUMBER     |  |

DATE MAILED: 03/13/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

| Application No.   Application No.   Applicant(s)   BAI  |  |   |  |   | <u> </u>             |  |  |  |  |
|---|--|---|--|---|----------------------|--|--|--|--|
| Examiner   Art Unit   Nathew E. Warren   2815   |  | Application No.   |  | Applicant(s)  |                      |  |  |  |  |
| ## Watthew E Warren   |  | 09/109,261  |  | BAI   |                      |  |  |  |  |
| The MALLING DATE of this communication app ars on the cover she it with the correspond no address—Period for Repty  A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE ② MONTH(S) FROM THE MALLING DATE OF THIS COMMUNICATION.  Extensions of the may be a validated where the processors of 3 CPR 1.136(a). In no event, honever, may a reply be timely filled after SX (b) MCMTHS from the making state of making the control of 3 CPR 1.136(a). In no event, honever, may a reply be timely filled after SX (b) MCMTHS from the making state of making the control of the communication of the processor. It is objected to reply within the adulation processor and processor and the communication of the processor and the communication of the communication is become ABANCONEO (30 U.S.C. § 133).  **Responsive to communication(s) field on *OT February 2002**.  **Status**  1) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under Ex parte Quayle, 1935 C.D. 11, 453 O.G. 213.  **Disposition of Claims**  4) Claim(s) **Stare allowed.**  6) Claim(s) **Stare allowed.**  6) Claim(s) **Istare objected to **Stare objected objected to **Stare objected objected to **Stare objected objected objected objected objected obj | Office Action Summary  | Examiner  |  | Art Unit  |                      |  |  |  |  |
| A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.  Expensions of time may be arrelated and the fine communication.  Expensions of time may be arrelated and the fine communication.  If the period for may specified above, the maximum statutory preinted will apply and will easily \$2X,00 No.OFT to born be mailing date of this communication.  If the period for may specified above, the maximum statutory preinted will apply and will easily \$2X,00 No.OFT to born be mailing date of this communication.  If the period for may specified above, the maximum statutory preinted will apply and will easily \$2X,00 No.OFT to born be mailing date of this communication. The period by the Circle and the specified above, the maximum statutory preinted will apply and will easily \$2X,00 No.OFT to born be mailing date of this communication. The period by the Circle and the communication of the communication of the period by the period by the Circle and the this three moments and the period by the consideration of the period by the period by the consideration is consideration.  Status  1)  Responsive to communication(s) filed on <i>QT February 2002</i> .  2a)  This action is FINAL.  2b)  This action is non-final.  3)  Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under Ex parte Queyle, 1935 C.D. 11, 453 O.G. 213.  Disposition of Claims  4)  Claim(s)  |  |   |  |   |                      |  |  |  |  |
| A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.  Enablastic of immerryle be sufficient and offer the processor of 3° CPR 1.15(g), in no event, however, may a reply be timely filed  If the period for reply a specified above is less share hirty (30 days, a reply white the sublicity minimum of hirty (30) days will be considered tendly.  If his period for reply a specified above, he maximum studinty period will apply and will apply at 50 (8) PACHTRS him him making date of this communication for the period for reply a specified above, he maximum studinty period will apply and will apply at 50 (8) PACHTRS him him making date of this communication and period tendle in the making date of this communication, even if timely filed, may reduce any seared potent tenn adjustment. Sea 3° CFR 1.704(a).  Status  1) Responsive to communication(s) filed on 07 February 2002.  2a) This action is FINAL.  2b) This action is non-final.  3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under Ex parte Quayle, 1935 C.D. 11, 453 O.G. 213.  Disposition of Claims  4) Claim(s) 8-21 is/are pending in the application.  4a) Of the above claim(s) is/are withdrawn from consideration.  5) Claim(s) is/are allowed.  6) Claim(s) is/are allowed.  7) Claim(s) is/are allowed.  8) Claim(s) 6-21 is/are rejected.  7) Claim(s) are subject to restriction and/or election requirement.  Application Papers  9) The specification is objected to by the Examiner.  10) The drawing(s) filed on is/are: a) accepted or b) objected to by the Examiner.  11approved, corrected drawings are required in reply to this Office action.  11by The period drawing or orrection filed on is/are approved by the Examiner.  11approved, corrected drawings are required in reply to this Office action.  11by Certified copies of the priority documents have been rece  |  | ars on the cover si   | he t with the co   | orrespond nc ac   | ldress               |  |  |  |  |
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| 11) The proposed drawing correction filed on is: a) approved b) disapproved by the Examiner.  If approved, corrected drawings are required in reply to this Office action.  12) The oath or declaration is objected to by the Examiner.  Priority under 35 U.S.C. §§ 119 and 120  13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  a) All b) Some * c) None of:  1. Certified copies of the priority documents have been received.  2. Certified copies of the priority documents have been received in Application No  3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  * See the attached detailed Office action for a list of the certified copies not received.  14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  a) The translation of the foreign language provisional application has been received.  15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.  Attachment(s)  1) Notice of References Cited (PTO-892)  2) Notice of Braftsperson's Patent Drawing Review (PTO-948)  5) Notice of Informal Patent Application (PTO-152)   | •  |   |  |   |                      |  |  |  |  |
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| 12   The oath or declaration is objected to by the Examiner.   Priority under 35 U.S.C. §§ 119 and 120     13   Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).   a)   All   b)   Some * c)   None of:   1.   Certified copies of the priority documents have been received.   2.   Certified copies of the priority documents have been received in Application No   3.   Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).   * See the attached detailed Office action for a list of the certified copies not received.   14)   Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).   a)   The translation of the foreign language provisional application has been received.   15)   Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.   Attachment(s)   Interview Summary (PTO-413) Paper No(s)   21   Notice of Draftsperson's Patent Drawing Review (PTO-948)   Notice of Informal Patent Application (PTO-152)  |  |   |  | ved by the Examin   | iei.                 |  |  |  |  |
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| 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)  5) Notice of Informal Patent Application (PTO-152)   |  |   |  |   |                      |  |  |  |  |
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## **DETAILED ACTION**

This Office Action is in response to the RCE filed on February 7, 2002.

## Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 8-21 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The phrase "scalable for a feature size technology" found in the independent claims is vague. It is unclear as to what dimensional parameters are encompassed by "scalable." Furthermore, "feature size technology" is vague because it is unclear as to what devices are included in such a technology.

## Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 8-13, and 15-20, as far as understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Gardner et al. (US 5,963,810) in view of Nagata et al. (US 4,015,281) and Momose et al. (US 5,990,516).

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Gardner shows (fig. 3D) a semiconductor device having a multi-layered gate dielectric formed directly on the substrate. The first dielectric layer (303) of the gate dielectric is formed on the substrate. The first dielectric layer is silicon nitride (col. 5, lines 25-44). The second dielectric layer of the gate dielectric is a high dielectric constant material (305) of BST (col. 3, lines 15-43) and is formed on the first dielectric layer. The dielectric constant of the first dielectric layer (SiN) is less than the dielectric constant of the second dielectric layer (BST). A gate electrode (307a) is formed on the multi-layered gate dielectric. Gardner shows all of the elements of the claims except the for the formula to determine the dielectric constant and the thickness of the dielectric being less than 1/3 the gate length. Nagata discloses in column 4, starting at line 40, an expanded formula to determine the dielectric constant. Momose et al. discloses (col. 2, lines 52-58) a semiconductor device in which the gate dielectric is less than 1/3 the gate length. The thin gate dielectric improves hot carrier reliability and ultimately the operating characteristics. The dielectric layers are inherently capable of being scaled because they have the same structure and materials as the claimed invention. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the gate dielectric of Gardner by using the formula disclosed by Nagata to determine the appropriate thickness of a bi-layered gate dielectric. It would have been obvious to also modify the gate dielectric of Gardner by providing the dielectric with a thickness in relation to the gate length. Momose teaches that determining the thickness of the gate dielectric with respect to the gate length helps improve operational characteristics.

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Claims 14 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gardner et al. (US 5,963,810) in view of Nagata et al. (US 4,015,281) and Momose et al. (US 5,990,516) as applied to claims 8 and 15 above, and further in view of Sato (US 5,258,645).

Gardner shows all of the elements of the claims except the third dielectric layer having a third dielectric constant. Sato discloses (col. 6, lines 49-58) a semiconductor device having a third insulating layer (12) formed as part of a tri-layered gate dielectric (17). The third layer (12) is silicon oxide and has a different dielectric constant than SiN and BST. The three-layer gate dielectric is formed to optimize the threshold voltage of the device and ultimately improve device characteristics (col. 4, lines 17-21). Therefore it would have been obvious to one of ordinary skill in the art to modify the bi-layer gate dielectric of Gardner by adding a third layer of dielectric material because Sata teaches that a triple layered gate dielectric optimizes the threshold voltage of a semiconductor and ultimately improves the device characteristics.

# Response to Arguments

Applicant's arguments with respect to claims 8-21 have been considered but are moot in view of the new ground(s) of rejection.

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#### Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew E. Warren whose telephone number is (703) 305-0760. The examiner can normally be reached on Mon-Thurs, and alternating Fri, 9:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on (703) 308-1690. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305-3432 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

MEW

March 10, 2002

EDDIE LEE

SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2000